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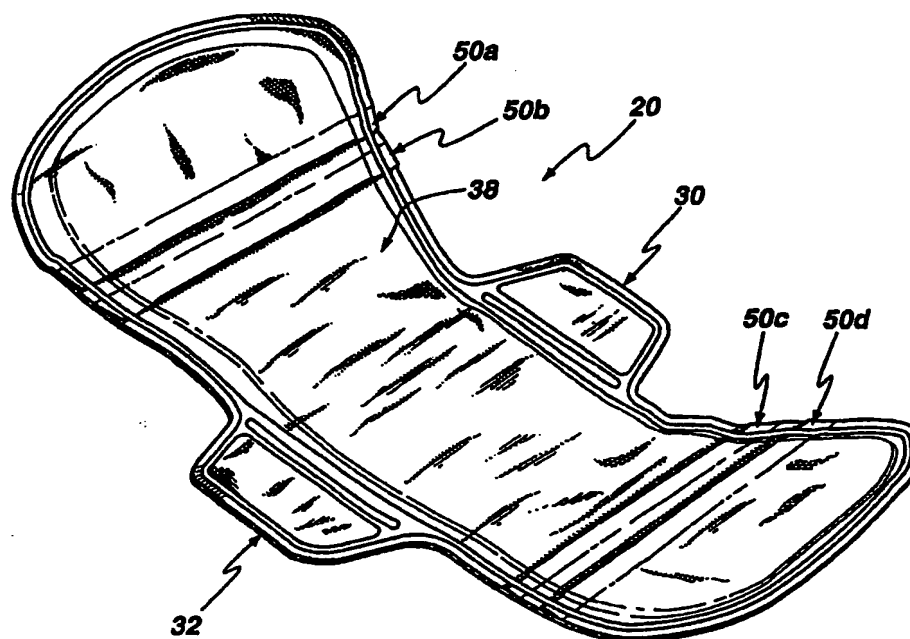
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(54) Title: ABSORBENT ARTICLE INCLUDING A COMPONENT LAYER HAVING A HINDRANCE TO FLUID FLOW ACROSS THE LAYER



(57) Abstract

The present invention provides a component layer suitable for use in a sanitary absorbent article, the component layer including; a) a substantially planar first portion; and b) a substantially planar second portion overlapping said first portion; said overlapping portions forming a vertical hindrance to the flow of a fluid across the component layer.

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## **ABSORBENT ARTICLE INCLUDING A COMPONENT LAYER HAVING A HINDRANCE TO FLUID FLOW ACROSS THE LAYER**

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### **FIELD OF THE INVENTION**

The present invention relates to sanitary absorbent articles such as feminine sanitary napkins, adult incontinence pads, infant diapers, underarm absorbent pads, and medical bandages.

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### **BACKGROUND OF THE INVENTION**

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Sanitary absorbent articles are articles of manufacture that generally are used to absorb and retain bodily exudates; they have both medical and non-medical uses. Conventional sanitary absorbent articles generally comprise several different layers of material joined together to form a laminate. Each of these layers is referred to as a "component layer" and serves a specific function within the article. Each layer is thus usually fabricated from a material different than that of the others, and has different physical properties and characteristics.

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The uppermost layer of material, *i.e.* that which faces the body of the wearer of the article is conventionally termed the "cover layer" or "top sheet". As the layer of the article which comes into physical contact with the human body, the cover layer must be relatively soft to the touch so as to avoid discomfort and prevent abrasions to the human tissue below during the time which the article is worn. The cover layer must be fluid permeable so as to permit the ingress of the bodily exudate into the article to be absorbed and retained. At the same time however, it should remain dry to prevent moisture from accumulating against the skin of the wearer that could cause irritations. In order to meet these desired characteristics, conventional cover layers are manufactured from a woven hydrophobic material or a synthetic plastic material having a large number of relatively small apertures per unit surface area.

The difficulty with cover layers of this construction is that a bodily exudate to be absorbed may accumulate on the surface of the cover layer for a small period of time before the entire volume of the exudate is actually absorbed into the layer and the layer(s) below. Depending on the orientation of the article with respect to the wearer and to gravitational forces, the accumulated exudate may begin to flow across the surface of the cover layer before being absorbed. In some instances this may not be a problem in that the exudate will simply be absorbed at a point a distance away from its point of impact on the surface of the article. In others, however, the exudate may eventually flow off the article itself and onto the garments of the wearer, presenting an extremely undesirable situation.

As an example, where the article is a sanitary napkin, it will be appreciated that when in use by a woman, the napkin assumes a generally curved shape with respect to her body. When she is sitting or standing, any menstrual fluid not immediately absorbed by the article may flow across the surface thereof to the lowest point along the curve.

Generally, such flow is longitudinal and the curvature of the cup itself will then prevent the liquid from flowing any further. However, when the wearer is lying down (*e.g.* during periods of sleep or rest) the conformation of the napkin itself will not form an obstruction preventing any fluid from flowing longitudinally off the edge of the article. Thus the undergarments of the wearer may become soiled.

This phenomenon is not unique to cover layers as, to a lesser extent, it has been observed on some of the other component layers (*e.g.* the transfer layer and the absorbent layer) of an absorbent article as well. In certain instances, exudate may flow along the surface of one of these other layers and egress the article instead of being absorbed and retained thereby.

It would be desirable therefore to have a component layer of an article to include a hindrance to fluid flow across the layer.

## OBJECT AND STATEMENT OF THE INVENTION

It is thus an object of an aspect of the present invention to provide a component layer of material suitable for use in a laminate sanitary absorbent having an increased ability to hinder the flow of a fluid across the surface thereof.

It is a further object of an aspect of the present invention to provide a sanitary absorbent article including a component layer having an increased ability to hinder the flow of a fluid across the surface thereof.

As embodied and broadly described herein, the present invention provides a component layer suitable for use in a sanitary absorbent article, the component layer including:

- (A) a substantially planar first portion; and
  - (B) a substantially planar second portion overlapping said first portion;
- said overlapping portions forming a vertical hindrance to the flow of a fluid across the component layer.

Component layers suitable for use in an absorbent article in accordance with the present invention are generally formed of relatively thin, flexible and lightweight material. Preferably, a component layer of the present invention is rectangular or dog-bone in shape, having two relatively shorter opposing transverse sides and two relatively longer opposing longitudinal sides. It should be understood, however, that no particular shape is essential to the invention, and, for example, component layers of the present invention may be any shape, including oval or circular. From each longitudinal side of the component layer there may project a flap, preferably trapezoidal in shape. Neither the presence of such flaps, nor their particular shape, is essential to the present invention. The component layer is usually symmetric about an imaginary longitudinal centre-line running through its centre point and generally parallel to the longitudinal sides, and about an imaginary transverse centre-line running through its centre-point and generally parallel to the transverse sides.

The component layer also has two faces designated by the general direction in which they are oriented when an article into which the component layer is incorporated is being correctly worn by a user. A "body-facing face" which faces the body of the wearer of the article, and a "garment-facing face" which is the opposite face and which faces the  
5 wearer's environment, which, although depending on which part of the body the article is being employed, is usually a garment. The thickness of the component layer at any particular point is the distance between the body-facing face and the garment-facing face measured along the line perpendicular to the plane defined by the longitudinal and transverse centre-lines when the layer is laid flat.

10 Particularly with respect to a component layer which when incorporated into a sanitary absorbent article will contact the skin of the wearer thereof, but also true to a lesser extent of other component layers of the article, the layer should be smooth enough to ensure her/his physical comfort and prevent abrasion. In this respect, it is required that  
15 both the first portion and the second portion of a component layer of the present invention be substantially planar so that the user of an article into which the component layer is incorporated will not perceive the presence of these portions as a result their overlap, nor be caused irritation thereby. As used in the context of the present specification, the term  
20 "substantially planar" is meant to include surfaces having gentle undulations (*i.e.* of a relatively minor amplitude) but not those having large wrinkles or sharp creases, ridges or the like. Furthermore, two portions should be considered to be overlapping when they, at least partially, lie one on top of the other when the component layer is laid flat. The overlapping portions may be in complete contact with one another, in partial contact, or generally in a spaced apart relationship. No particular state in this respect is required nor is  
25 essential, neither when the article is laid flat nor when it is in use.

When the two portions are in an overlapping relationship as previously described they will form a vertical hindrance to fluid-flow across the component layer. One important cause of this hindrance will be the contact of the liquid with the edge of the  
30 second (*i.e.* closer to the wearer) portion of the overlapping portions. It is not necessary, however, that this edge be at any particular angle with respect to the plane formed by the component layer when laid flat. Edges having a variety of angles will accomplish this task

(i.e. of hindering) although some angles may present a greater hindrance than others. The word "vertical" in the context of the present specification should not therefore be interpreted as requiring any such angle, as it is used herein simply to indicate a hindrance is in the path of the fluid-flow desired to be hindered. It is not necessary that such a hindrance completely, or even partially, arrest the flow of the fluid desired to be so hindered. In order to constitute a hindrance within the present context, it is merely required that the flow rate of at least a part of the fluid to be hindered is reduced by contact with the hindrance. The direction of flow to be hindered is that "across" the body-facing face of component layer as opposed to through the thickness of the layer itself.

Advantageously, the overlapping portions are capable of accepting the fluid thereinbetween. In such instances some of the fluid flowing across the component layer may, when encountering the edge of the second portion, may be directed and caused to flow between the portions. Such fluid may be detained within the overlapping portions increasing the hindrance presented thereby.

More preferably, the overlapping portions are separable, i.e. capable of being separated, meaning that the pocket formed thereby is expandable. (The term 'pocket' should be understood in the present context as signifying a compartment formed in the material that comprises the cover layer having a single opening, excluding any pores present in the material itself.) As such, as fluid accumulates between the portions in the pocket formed thereby, the distance between the portions will increase as the pocket expands. It is more likely then that additional fluid flowing across the layer will become entrapped within the pocket; separable overlapping portions thus form a greater hindrance to fluid flow. The portions may be caused to be capable of separating through a variety of methods. Such will be the case, for example, where the material of which the component layer is formed is extensible, where either portion itself contains pleats or folds permitting this effect, where there is a slight excess of material forming the second portion, or simply where the sides of the layer are capable of being drawn in. Preferably, the article is constructed such that the pocket will return to its original (i.e. unexpanded) state once all of the fluid entrapped therein has been absorbed into the article.

A simple embodiment of the present invention is a component layer formed of a single piece of material and having a pleat, *i.e.* a flattened fold therein doubled over upon itself, or a plurality of such pleats. The pleat will thus consist of three layers of material and a cross-section thereof would be Z-shaped. The pleat would define two pockets, one with an opening accessible from the body-facing face of the component layer, the other with an opening accessible from the garment-facing face of the component layer. For present purposes, it is only the pocket having an opening accessible from the body-facing face that is relevant.

The pleats should be formed and/or positioned such that the opening in the pocket faces in the direction from which it is likely that the fluid to be absorbed will flow. Thus, where the article is a sanitary napkin, the pleats will most likely lie parallel to the transverse centre-line at some distance therefrom, *i.e.* closer to the longitudinal ends of the article than the transverse centre-line, and have a body-facing face opening facing in the direction of the transverse centre-line. In this manner, when fluid flowing across the body-facing face of the component layer encounters the opening in the pocket defined by the overlapping portions its progress is hindered somewhat thereby, increasing the chances that the fluid will be absorbed within the article.

It should be understood, however, that no particular placement of the pleats with respect to the transverse centre-line is required, and thus pleats may be located at any distance away therefrom. In addition, no particular number of pleats, nor any particular size nor spacing, is required, and thus these qualities/quantities may all vary within the scope of the present invention.

An alternative embodiment of the invention would have two different sheets of material of the appropriate size and shape to form a cover layer overlap in over a portion of each. The overlapping portions thus formed would be similar to that described above except that they would form a two-ply sleeve instead of a three-ply pocket. (The term 'sleeve' should be understood in the present context as signifying a compartment formed in the material that comprises the cover layer having two openings, excluding any pores present in the material itself.) The sleeve so formed would have two openings, one



accessible from the body-facing face of the component layer, the other accessible from the garment-facing face. The sheets should be constructed such that the opening in the body-facing face of the sleeve faces in the direction from which it is likely that the fluid to be absorbed will flow. In this manner, when fluid flowing across the body-facing face of the component layer encounters the opening in the sleeve defined by the overlapping portions  
5 its progress is hindered somewhat thereby, increasing the chances that the fluid will be absorbed within the article. Additionally, fluid flowing between the portions would be directed thereby through the sleeve and be deposited on the underlying component layer.

10 This embodiment of the invention is not limited to an article having a single sleeve in a component layer; component layers constructed of multiple sheets having a plurality of sleeves are also included. Moreover, it is not necessary that each of the sheets of a component layer of this embodiment of the present invention be of the same material, as component layers having sheets of different material are also within its scope.

15 A third embodiment of the invention would encompass the simple placement of additional material on the cover layer to form a "sleeve-like" overlapping portion and act as a hindrance to fluid flow. Alternatively, this material could be sealed to the cover layer in various configurations to form a "pocket-like" structure to entrap the fluid in addition to  
20 acting as a simple hindrance.

In another aspect, as embodied and broadly described herein, in accordance with the present invention there is provided a laminate sanitary absorbent article comprising a plurality of component layers, wherein one of said component layers includes:

- 25 (A) a substantially planar first portion;  
(B) a substantially planar second portion overlapping the first portion;  
the overlapping portions of one of said component layers forming a vertical hindrance to the flow of a fluid across the one of said component layers. Preferably, the overlapping portions are capable of accepting the fluid thereinbetween.

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Typically, the component layers of a laminate absorbent article of the present invention will include a fluid-permeable body-facing layer, a fluid-impervious garment-

facing layer, and an absorbent layer between the body-facing layer and the garment-facing layer. Additionally, a fluid-permeable intermediate layer (also termed a 'transfer layer') may be included between the body-facing layer and the absorbent layer. Any one (or more than one, or even all) of the body-facing layer, the intermediate layer (if present), and the absorbent layer may include overlapping portions in accordance with the present invention as previously described.

Preferably, there is further provided a laminate sanitary absorbent article having an absorbent layer of the present invention wherein the second portion of the absorbent layer has a substantially-impermeable first-portion-facing face. No particular means for causing the first-portion facing face of the second portion to be substantially-impermeable are essential to the present invention. Hence, within the scope of this aspect of the invention are a variety of conventional techniques for causing same, including the application of chemicals or films to the second portion, and even at the limit the interposition of a material between the first portion and the second portion. Where the latter is the case, it is not necessary that such material be affixed to the first-portion-facing-face of the second portion.

The advantage of such a construction is the reduction of the possibility of "wet-back". Wet-back is a condition familiar to those skilled in the art wherein, because of pressure exerted on the absorbent napkin, some of the fluid entrapped therein is released (generally along the reverse of the pathway through which it was absorbed). By constructing the first-portion-facing face of the second portion in this manner, any fluid released by pressure on the napkin will not have a pathway of escape (or will have a reduced chance of encountering an escape pathway) and will thus remain entrapped within the napkin, despite the pressure.

Of further advantage, there is provided a laminate sanitary absorbent article having an absorbent layer of the present invention further comprising a spacer member between the first portion and the second portion of said absorbent layer, said spacer member having a higher void volume per unit volume than the first portion and the second portion. Generally, the material of which an absorbent layer is constructed is selected in view of its

capability and capacity to absorb and retain a fluid as opposed to the rate in which such fluid is absorbed and retained. Thus it is probable to have a very high-volume, yet slow-rate, absorbent material. The spacer member, however, having a relatively large void volume per unit volume will be able to rapidly, albeit temporarily, store a large volume of fluid. Thus, fluid flowing across the surface of the absorbent layer will encounter the vertical hindrance formed by the overlapping portions and will enter the space member and be temporarily stored pending its absorption by the absorbent layer.

Advantageously, there is further provided a laminate sanitary absorbent article having an absorbent layer of the present invention wherein the first portion of said absorbent layer has areas of reduced average pore size as compared with the overall average pore size of said absorbent layer, to provide for increased wicking. It is known in the art that the absorptive force exerted by a material is inversely related to the size of the pores in the material into which the fluid to be absorbed will be drawn. Thus, the areas of reduced pore size will tend to be more absorptive than the rest of the first portion or of the layer and will have a wicking effect. In this manner, more of the fluid contacting the vertical hindrance will be directed within the areas of reduced pore size and drawn in between the overlapping portions, reducing the likelihood that any fluid will escape the napkin and soil the wearer's garments.

Similarly, it would also be possible to form a transfer layer of the present invention having such areas of reduced pore size.

Other objects and features of the invention will become apparent by reference to the following description and the drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of preferred embodiments of the present invention is provided hereinbelow with reference to the following drawings, in which:

Figure 1 is a perspective view of a laminate sanitary absorbent article including a cover layer of present invention;

Figure 2 is a top plan view of the article (body-facing face) of Figure 1;

Figure 3 is a cross-sectional view of the article along the line 3--3 in Figure 2;

5     3;  
Figure 4 is a cross-sectional view of a second embodiment similar to that of Figure

Figure 4a is an expanded view of the cross-section in Figure 4;

Figure 5 is a cross-sectional view of the article of Figure 1 while in use by a wearer  
in a standing position;

10     Figure 6 is a cross-sectional view similar to that in Figure 5 while the wearer is  
lying in a prone position;

Figure 7 is an expanded view of the cross-section in Figure 6;

Figure 8 is a cross-sectional view of a third embodiment similar to that of Figure 3  
including a cover layer of the present invention;

15     Figure 9 is a cross-sectional view of a fifth embodiment including a transfer layer of  
the present invention;

Figure 10 is a cross-sectional view of a sixth embodiment including a transfer layer  
of the present invention;

Figure 11 is a cross-sectional view of a seventh embodiment including a cover layer  
and a transfer layer of the present invention;

20     Figure 12 is a cross-sectional view of an eighth embodiment including a cover layer  
and a transfer layer of the present invention;

Figure 13 is a cross-sectional view of a ninth embodiment including an absorbent  
layer of the present invention;

25     Figure 14 is a cross-sectional view of a tenth embodiment including an absorbent  
layer of the present invention;

Figure 15 is a cross-sectional view of an eleventh embodiment including an  
absorbent layer of the present invention; and

Figure 16 is a perspective view of a twelfth embodiment of an absorbent layer of  
the present invention.

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In the drawings, preferred embodiments of the invention are illustrated by way of  
example. It is to be expressly understood that the description and drawings are only for

purposes of illustration and as aid to understanding, and are not intended to be a definition of the limits of the invention.

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## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to Figure 1 & 2 there is illustrated a preferred embodiment of a laminate sanitary absorbent article of the present invention, a feminine sanitary napkin 20. The napkin 20 is of a dog-bone shape and has four sides: two longer curved opposing longitudinal sides 22, 24 and two shorter rounded opposing transverse sides 26, 28. An isosceles-trapezoidal-shaped flap 30, 32 projects from each of the longitudinal sides 22, 24. The napkin 20 is symmetric about two perpendicular imaginary centre-lines: a longitudinal centre-line 34 running down the length of the napkin 20 through its centre-point and equidistant from the longitudinal sides 22, 24; and a transverse centre-line 36 running across the width of the napkin 20 through its centre-point and equidistant from the transverse sides 26, 28. The napkin 20 has two faces, a body-facing face 38 and an opposing garment-facing face (not shown). Each component layer thereof has a similar physical description.

In this embodiment, the length of the napkin 20 along the longitudinal centre-line 34 is 24 cm, while that along the transverse centre-line 36 is 8.1 cm not including the flaps 30, 32, and 14.5 cm including the flaps 30, 32. The length of the napkin 20 as measured along a line parallel to the transverse centre-line 36 stretching across the widest portion of the "dog-bone" is 11.0 cm. The flaps 30,32 themselves are in the shape of an isosceles trapezoid and have a base measurement (*i.e.* the parallel side which joins the longitudinal edge of the napkin) of 5.0 cm, and a top measurement (*i.e.* the opposing parallel side) of 3.0 cm.

Referring to Figure 3, the napkin 20 includes a body-facing cover layer 40, a garment-facing barrier layer 44, an absorbent layer 42 between the cover layer 40 and the barrier layer 44. As shown in Figures 4 and 4a, such an absorbent napkin most preferably includes a transfer layer 46 between the cover layer 40 and the absorbent layer 44.

Attached to the garment facing surface of the barrier layer 44 are a number of adhesive strips 48 for affixing the napkin 20 to the undergarment of the wearer. Each of these component layers will now be individually described.

## 5 Cover Layer

The cover layer 40 may be a relatively low density, bulky, high-loft non-woven web material. The cover layer 40 may be composed of only one type of fibre, such as polyester, or it may be composed of bicomponent or conjugate fibres having a low melting  
10 point component and a high melting point component. The fibres may be selected from a variety of natural and synthetic materials such as nylon, polyester, rayon (in combination with other fibres), cotton acrylic fibre and the like and combinations thereof.

Bicomponent fibres may be made up of a polyester core and a polyethylene sheath.  
15 The use of appropriate bicomponent materials results in a fusible non-woven fabric. Examples of such fusible fabrics are described in U.S. patent 4555430 issued November 26, 1985 to Mays. Using a fusible fabric increases the ease with which the cover layer 40 may be mounted to the adjacent transfer layer 46 and/or to the barrier layer 44.

20 The cover layer 40 preferably has a relatively high degree of wettability, although the individual fibres comprising the cover may not be particularly hydrophilic. The cover material should also contain a great number of relatively large pores. This is because the cover layer 40 is intended to absorb body fluid rapidly and transport it away from the body and the point of deposition. Preferably, the fibres which make up the cover layer 40 should  
25 not lose their physical properties when they are wetted, in other words they should not collapse or lose their resiliency when subjected to water or body fluid. The cover 40 may be treated to allow fluid to pass through it readily. The cover layer 40 also functions to transfer the fluid quickly to the other layers of the absorbent structure. Thus, the cover 40 is preferably wettable, hydrophilic and porous. When composed of synthetic hydrophobic  
30 fibres such as polyester or bicomponent fibres, the cover 40 may be treated with a surfactant to impart the desired degree of wettability.

Most preferably, the cover layer 40 is made of polymer film having large pores. Because of such high porosity, the film accomplishes the function of quickly transferring body fluid to the inner layers of the absorbent structure. Apertured co-extruded films such as RETICULON brand, for example, described in U.S. patent 4,690,679 are useful as cover  
5 layers in the absorbent structures of this invention.

### Transfer Layer

Optionally, adjacent to the cover layer 40 on its inner side and bonded to the cover  
10 layer 40 is a fluid transfer layer 46 that may form part of the absorbent system. The transfer layer 46 provides the means of receiving body fluid from the cover layer 40 and holding it until the highly-dense absorbent layer 42 has an opportunity to absorb the fluid.

The transfer layer 46 is, preferably, more dense than and has a larger proportion of  
15 smaller pores than the cover layer 40. These attributes allow the transfer layer 46 to contain body fluid and hold it away from the outer side of the cover layer 40, thereby preventing the fluid from re-wetting the cover layer 40 and its surface. However, the transfer layer 46 is, preferably, not so dense as to prevent the passage of the fluid through the layer into the absorbent layer 42.

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The transfer layer 46 may be composed of fibrous materials, such as wood pulp, polyester, rayon, flexible foam, or the like, or combinations thereof. The transfer layer 46 may also comprise thermoplastic fibres for the purpose of stabilizing the layer and maintaining its structural integrity. The transfer layer 46 may be treated with surfactant on  
25 one or both sides in order to increase its wettability, although generally the transfer layer 46 is relatively hydrophilic and may not require treatment. The transfer layer 46 is preferably bonded on both sides to the adjacent layers, i.e. the cover layer 40 and the absorbent layer 42.

### **Absorbent Layer**

Immediately adjacent to and bonded to the transfer layer 46 is the absorbent layer 42. The absorbent layer 42 is preferably a highly dense layer having a fine porosity. It has a large liquid holding capacity and it is extremely retentive. Most preferably, the absorbent layer 42 is composed of compressed sphagnum moss material. More specifically, the sphagnum moss is formed as a board by air or wet laying and calendering to obtain a relatively thin, i.e. from about 0.01 to 0.10 inch thick, relatively dense, i.e. from about 0.2 to 1.0 g/cm<sup>3</sup>, sheet like structure. It is then tenderized, reducing the density to between 0.05 and 0.1 g/cm<sup>3</sup>. The structure may include a layer of Kraft tissue laminated on one or both surfaces of the sphagnum moss layer. Preferably, a fibrous component is admixed with the sphagnum moss material. The fibrous component is suitably a natural or synthetic textile fibre such as rayon, polyester, nylon, acrylic or the like, having a length of from about 0.25 to 1.5 inches and a denier of from about 1.0 to 5. The fibrous component may be present in an amount from about 2 to 20% by weight, most preferably from 4 to 8%. The absorbent layer 42 may also comprise other components such as wood pulp, synthetic wood pulp, thermomechanical pulp, mechanically ground pulp, polymers, surfactants, super-absorbents and the like.

In an alternative embodiment, the absorbent system includes a single layer of pulp fluff material (the transfer layer is omitted). The absorbent layer 42 preferably comprises a pulp fluff material and may optionally include other absorbent materials or non-absorbent materials which aid in stabilizing the absorbent structure such as conjugate fibres, fusible fibres, binders, sphagnum peat moss particles, super-absorbents, and the like and combinations thereof, and may optionally include other absorbent materials or non-absorbent materials which aid in stabilizing the absorbent structure such as conjugate fibres, fusible fibres, binders, sphagnum peat moss particles, super-absorbents, and the like and combinations thereof.



### **Barrier Layer**

Underlying the absorbent system is a barrier layer 44 comprising liquid-impervious film material so as to prevent liquid that is entrapped in the absorbent layer 42 from egressing the sanitary napkin and staining the wearer's undergarment. Most preferably, the barrier layer 44 is made of polymeric film, such as polyethylene which is both inexpensive and readily available. The polyethylene is capable of fully blocking the passage of liquid or gas that may emanate from the absorbent system. In a variant, breathable films may be used that allow passage of gases while blocking liquid.

The cover layer 40 and the barrier layer 44 are joined along their marginal portions so as to form an enclosure that maintains the absorbent system captive. The joint may be made by means of adhesives, heat-bonding, ultrasonic bonding, radio frequency sealing, mechanical crimping, and the like and combinations thereof. The peripheral seal line is shown in Figure 2 by the reference numeral 52.

### **Adhesive Structures**

In order to further enhance the stability of the sanitary napkin 20, the napkin may be provided with adhesives 48, such as hot-melt adhesives capable of establishing a temporary bond with the undergarment material. These adhesives 48 may be applied to the bottom (garment-facing face) of the barrier layer 44 in various patterns, including complete adhesive coverage, parallel longitudinal lines, a line of adhesive following the perimeter of the structure, transverse lines of adhesive or the like. Alternatively, the sanitary napkin of this invention may be attached to a belt that encircles the waist of the wearer.

### **Physical Description**

As shown in Figures 1 to 4a, the cover layer 40 of the napkin 20 has a series of overlapping portions 50a, 50b, 50c, 50d; two on either side of the transverse centre-line 36. These overlapping portions 50a, 50b, 50c, 50d each stretch transversely across the width of the cover layer 40 generally parallel to the transverse centre-line 36 and to one another.

Each of the overlapping portions 50a, 50b, 50c, 50d is formed by a pleat in the material of which the cover layer 40 is composed. These pleats are simply flattened folds in the cover layer 40 which when viewed along a longitudinal cross section of the napkin (as in Figures 3, 4, and 4a) are of a flattened Z-shaped. The overlapping portions 50a, 50b, 50c, 50d thus comprise a first portion 52a, 52b, 52c, 52d and an overlapping second portion 54a, 54b, 54c, 54d.

The edge 56b of the second portion 54b of the second 50b of the series of overlapping portions forms a line parallel to the transverse centre-line 36 of the napkin at distance 6.1 cm therefrom. Similarly, the edge 58b of the first portion 52b of the second 50b of the series of overlapping portions forms a line parallel to the transverse centre-line 36 at a distance 6.8 cm therefrom. Thus the width (*i.e.* distance between the edge 56b of the second portion 54b and the edge 58b of the first portion 52b) of the overlapping portions 52b, 54b of the second 50b of the series of overlapping portions is 0.7 cm. In a similar fashion, the edges 56a, 58a of both the second portion 54a and the first portion 52a of the first 50a of the series of overlapping portions form lines parallel to the transverse centre-line. The distance from the edge 56a of the second portion 54a to the transverse centre-line 36 is 7.3 cm, and from the edge 58a of the first portion 54a is 8.0 cm. Thus, the width of the first 50a of the series of overlapping portions is 0.7 cm. As the napkin 20 is symmetric about the transverse centre-line 36 these distances and measurements are valid for both sides thereof (*i.e.* the measurements with respect to 50d are the same as those for 50a and those of 50c are the same as those of 50b). It should be understood that none of these distances is critical to the invention and thus a wide variety of overlapping portion configurations is possible. Furthermore, while overlapping portions that are parallel to the transverse centre-line 36 are highly preferred, it would still be possible within the scope of the present invention to have such portions be at an angle thereto.

Referring to Figure 5, when a sanitary napkin 20 of the present invention is in use by a female, the napkin adopts a curved shape with respect to her body about the pudendal region. Despite the curvature of the napkin, the overlapping portions 52a/54a, 52b/54b, 52c/54c, 52d/54d, preferably remain flush with one another to prevent the wearer from being caused discomfort thereby.

Referring to Figure 6, menstrual fluid 60 to be absorbed by the napkin will be deposited on the cover layer 40 at a point between the first of the series of overlapping portions 50a, 50b, 50c, 50d on either side of the transverse centre-line 36. When the  
5 wearer is lying flat (*i.e.* on her stomach or back), some of the fluid 60 not immediately absorbed by the napkin may begin to flow along the body-facing surface 38 of the cover layer 40 in the direction indicated by the arrow in Figure 6.

A portion of the fluid 60 may encounter the second 50b of the series of pleats,  
10 specifically the edge 56b of the second portion 54b thereof. This edge 56b constitutes a vertical hindrance to fluid-flow and should retard the exudate's 60 progress across the layer 40, giving it more time to be absorbed through the cover layer 40. A part of the exudate will most likely flow under the second portion 54b separate the second portion 54b from the first portion 52b, and enter the pocket 62b, as depicted in Figure 7. Such exudate 60 will  
15 be temporarily retained within the pocket 62b until absorbed through the cover layer 40 and into the layers below. The raised second portion 54b of the now open pocket 62b will thus constitute an even greater vertical hindrance to fluid flow across the layer 40.

A part of the exudate may flow over top (*i.e.* along the body-facing surface 38) of  
20 the second portion 54b, as opposed to becoming entrapped within the pocket 62b. In such case, if not absorbed, it may continue to flow along the body-facing surface 38 of the cover layer 40 and may eventually encounter the first 50a of the series of pleats. This pleat is identical to the second pleat 50b and the interaction of the fluid therewith is the same as that described hereinabove in relation thereto.

25 In this embodiment, the material forming the cover layer 40 is not extensible, but is lightweight and flexible. Thus when fluid separates the first 52b, 52a and second portions 54b, 54a and opens the pocket 62b, 62a, a portion of the longitudinal side of the napkin around where the edge of the pleat is attached will be drawn in. The second portion 54b,  
30 54a of the pleat is therefore under a minor tension so that when there is no further exudate to be absorbed within the pocket 62b, 62a, the second portion 54b, 54a will return to its original state and will lie substantially planar over top the first portion 52b, 52a.

In the embodiment illustrated in Figure 8, the overlapping portions 850a, 850b, 850c are not formed by a series of pleats, rather the cover layer 840 of this embodiment is formed from a series of discrete segments 864, 866, 868, 870 of material (others not shown). The primary segment 870 forms the centre of the layer and stretches a distance away from the transverse centre-line on either side thereof. The transverse edge portions of the primary segment 870 will form the first portions 852c of the third overlapping portions 850c on either side of the transverse centre-line (only one side shown). The secondary segments 868 have a first transverse edge 856c closer to the transverse centre-line of the layer than the transverse edges 858c of the primary segment 870. Thus the first edge portion of the secondary segment 868 will form the second portion 854c of the third overlapping portion 850c on either side of the transverse centre-line (only one side shown). The secondary segments 868 stretch away from their first transverse edges 856c some distance past the transverse edge 858c of the first segment 870 to a second transverse edge 858b. This second transverse edge portion forms the first portion 852b of the second overlapping portion 850b on either side of the transverse centre-line (only one side shown). The tertiary segments 866 have a first transverse edge 856b closer to the transverse centre-line of the layer than the second transverse edges 858b of the secondary segments 868 but further than the second transverse edges 858c of the primary segment 870. The tertiary segments 866 stretch away from their first transverse edges 856b some distance past the second transverse edge 858b of the secondary segment 868 to a second transverse edge 858b. This second transverse edge portion forms the first portion 852a of the first overlapping portion 850a on either side of the transverse centre-line (only one side shown). The quaternary segments 864 have a first transverse edge 856a closer to the transverse centre-line of the layer than the second transverse edges 858a of the tertiary segments 866 but further than the second transverse edges 858b of the secondary segments 866. The quaternary segments 864 stretch away from their first transverse edges 856a some distance to form the transverse edges 826 of the layer itself. This first edge portion of the quaternary segment 864 will form the second portion 854a of the second overlapping portion 850a on either side of the transverse centre-line (only one side shown).

In cover layers of this construction, the overlapping portions 850a, 850b, 850c form sleeves as opposed to pockets. The general interaction with flowing exudate is similar to that described hereinabove with respect to pocket-forming overlapping portions, with an exception that the sleeves formed by the overlapping portions 850a, 850b, 850c do not have the ability to retain liquid therein pending its absorption through the cover layer, rather they will act as conduits for the exudate and will deposit it directly on the layer underlying the cover layer.

In addition other component layers of a laminate sanitary absorbent napkin may also be constructed in accordance with the present invention. In Figure 9, there is illustrated a napkin having a transfer layer 946 including a plurality of pleats 950a, 950b similar to those as described above in relation to the cover layer. Similarly, in Figure 10, there is a illustrated a napkin having a transfer layer 1046 including a series of "sleeve" overlapping portions 1050a, and 1050b formed as described herein above.

The employ of such a transfer layer is generally independent of whether other component layers of the same napkin have been constructed in accordance with the present invention. Thus, it would be possible to have a napkin with a transfer layer and/or a cover layer and/or an absorbent layer constructed in accordance with the present invention. Where it is desired to have two of such layers, *e.g.* a cover layer and a transfer layer, of the present invention incorporated into a single napkin, alternate embodiments are again possible. Referring to Figure 11, in one alternate embodiment a single overlapping portion (*e.g.* 1150a, 1150b) will contain portions of both of the component layers. In this respect, the cover layer 1140 and the transfer 1146 layer are laid one on top of the other and a series of pleats is formed therein as if the layers were a single layer, thus forming a composite layer. In Figure 12, there is another alternative embodiment wherein the overlapping portions 1250a, 1250b are sleeves instead of pockets.

Now referring to Figure 13, in another embodiment of the present invention the absorbent layer 1342 of a sanitary napkin is formed having overlapping portions 1350a, 1350b as previously described. The napkin depicted in Figure 13 includes an absorbent layer 1342 sandwiched between a cover layer 1340 and a barrier layer 1344. It would be

possible to form such a napkin including a transfer layer (not shown) between the cover layer 1340 and the absorbent layer 1342.

Alternative embodiments of absorbent layers of the present invention are also possible. In Figure 14, the face of the second portions 1454a, 1454b of the overlapping portions 1450a, 1450b which faces the first portion 1452a, 1452b of the overlapping portions 1450a, 1450b of the absorbent layer 1444 is a substantially fluid-impermeable. (Shown in the Figure through the interposition of an impermeable layer 1464a, 1464b of a plastic material between the second portion 1454a, 1454b and the first portion 1452a, 1452b. Note that for illustrative purposes, the relationship of the impermeable layer 1464a, 1464b to the first 1452a, 1452b and second 1454a, 1454b portions is not to scale.)

Referring to Figure 15, it is also possible to interpose between the first portion 1552a, 1552b and the second portion 1554a, 1554b of an absorbent layer 1544 of the present invention a spacer member 1566a, 1566b having void volume per unit volume which is greater than that of the material which comprises the absorbent layer. While there are a variety of conventional materials that may be used as spacer members, the preferred material is bulky, air-laid and non-absorbent such as polyethylene or polypropylene. (Note that for illustrative purposes, the relationship of the spacer member 1566a, 1566b to the first 1552a, 1552b and second 1554a, 1554b portions is not to scale.)

Finally, referring to Figure 16, it is possible to form a absorbent layer 1642 wherein the body-facing face 1638 has areas of reduced average pore size 1668 as compared with the overall average pore size of the layer. There are several conventional methods for forming such areas, including subjecting the layer to pressure by passing it through patterned rollers, as is well known in the art.

The above description of preferred embodiments should not be interpreted in a limiting manner since other variations, modifications and refinements are possible within the spirit and scope of the present invention. The scope of the invention is defined in the appended claims and their equivalents.

**CLAIMS**

1. A component layer suitable for use in a sanitary absorbent article, the component layer including:
  - 5 (A) a substantially planar first portion; and
  - (B) a substantially planar second portion overlapping said first portion; said overlapping portions forming a vertical hindrance to the flow of a fluid across the component layer.
- 10 2. A component layer suitable for use in a sanitary absorbent article as recited in claim 1, wherein said overlapping portions are capable of accepting the fluid thereinbetween.
- 15 3. A component layer suitable for use in a sanitary absorbent article as recited in claim 2, wherein said overlapping portions are separable.
4. A component layer suitable for use in a sanitary absorbent article as recited in claim 3, wherein said overlapping portions define a pocket.
- 20 5. A component layer suitable for use in a sanitary absorbent article as recited in claim 3, wherein said overlapping portions define a sleeve.
6. A component layer suitable for use in a sanitary absorbent article as recited in claim 1, wherein said overlapping portions are formed by a pleat in the component layer.
- 25 7. A laminate sanitary absorbent article comprising a plurality of component layers, wherein one of said component layers includes:
  - (A) a substantially planar first portion; and
  - (B) a substantially planar second portion overlapping the first portion;the overlapping portions of the one of said component layers forming a vertical hindrance to the flow of a fluid across the one of said component layers.
- 30

8. A laminate sanitary absorbent article as recited in claim 7, wherein the overlapping portions are capable of accepting the fluid thereinbetween.
9. A laminate sanitary absorbent article as recited in claim 8, wherein the overlapping portions of the one of said component layers are separable.
10. A laminate sanitary absorbent article as recited in claim 8, wherein the overlapping portions of the one of said component layers define a pocket.
11. A laminate sanitary absorbent article as recited in claim 8, wherein the overlapping portions of the one of said component layers define a sleeve.
12. A laminate sanitary absorbent article as recited in claim 7, wherein the overlapping portions of the one of said component layers are formed by a pleat in said component layer.
13. A laminate sanitary absorbent article as recited in claim 7, wherein said component layers include:
- (A) a fluid-permeable body-facing layer;
  - (B) a fluid-impervious garment-facing layer; and
  - (C) an absorbent layer between said body-facing layer and said garment-facing layer.
14. A laminate sanitary absorbent article as recited in claim 13, wherein the one of said component layers is said body-facing layer.
15. A laminate sanitary absorbent article as recited in claim 13, wherein said component layers further include a fluid-permeable intermediate layer between said body-facing layer and said absorbent layer.
16. A laminate sanitary absorbent article as recited in claim 15, wherein the one of said component layers is said intermediate layer.



- 5 17. A laminate sanitary absorbent article as recited in claim 16, wherein the first portion of said intermediate layer has areas of reduced average pore size as compared with the overall average pore size of said intermediate layer, to provide for increased wicking.
- 10 18. A laminate absorbent article as recited in claim 15, wherein the one of said component layers is a composite layer comprising said cover layer and said transfer layer.
- 15 19. A laminate sanitary absorbent article as recited in claim 8, wherein said component layers include:  
(A) a fluid-permeable body-facing layer;  
(B) a fluid-impervious garment-facing layer; and  
(C) an absorbent layer between said body-facing layer and said garment-facing layer;  
and the one of said component layers is said absorbent layer.
- 20 20. A laminate sanitary absorbent article as recited in claim 19, wherein the second portion of said absorbent layer has a substantially-impermeable first-portion-facing face.
- 25 21. A laminate sanitary absorbent article as recited in claim 19, further comprising a spacer member between the first portion and the second portion of said absorbent layer, said spacer member having a higher void volume per unit volume than the first portion and the second portion.
- 30 22. A laminate sanitary absorbent article as recited in claim 19, wherein the first portion of said absorbent layer has areas of reduced average pore size as compared with the overall average pore size of said absorbent layer, to provide for increased wicking.
23. A laminate sanitary absorbent article as recited in claim 19, wherein a second of

said component layers includes:

(A) a substantially planar first portion; and

(B) a substantially planar second portion overlapping the first portion;

the overlapping portions of the second of said component layers forming a vertical  
hindrance to the flow of a fluid across second of said component layers.

24. A laminate sanitary absorbent article comprising:

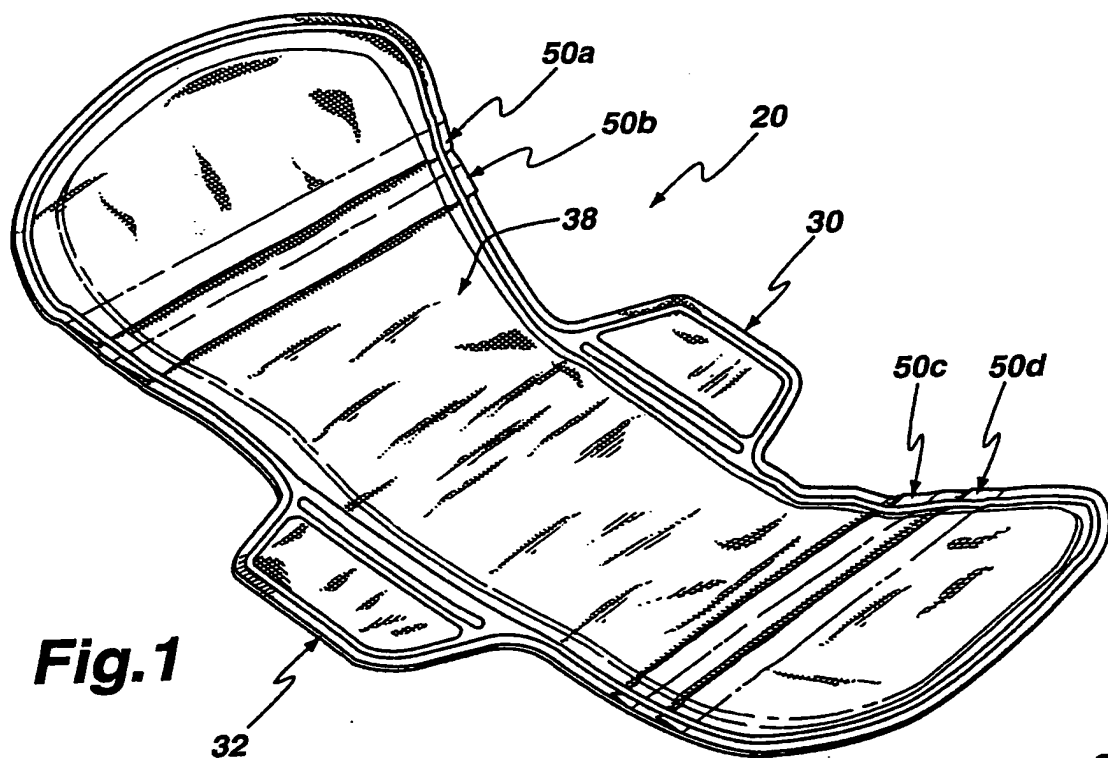
(A) a fluid-permeable body-facing layer; said body-facing layer including a  
plurality of pleats forming vertical hindrances to the flow of a fluid across  
said body-facing layer.

(B) a fluid-impervious garment-facing layer; and

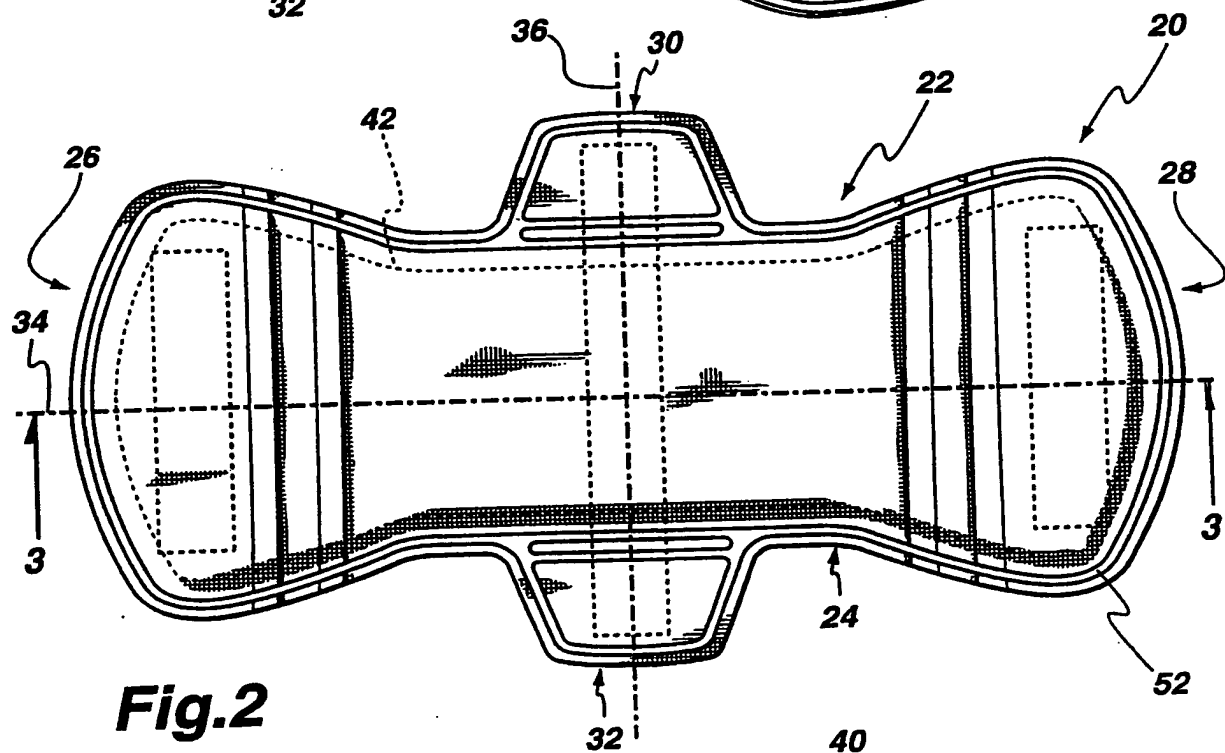
(C) an absorbent layer between said body-facing layer and said garment-facing  
layer.

25. A laminate sanitary absorbent article as recited in claim 24, further comprising a  
fluid permeable intermediate layer between said body-facing layer and said absorbent  
layer.

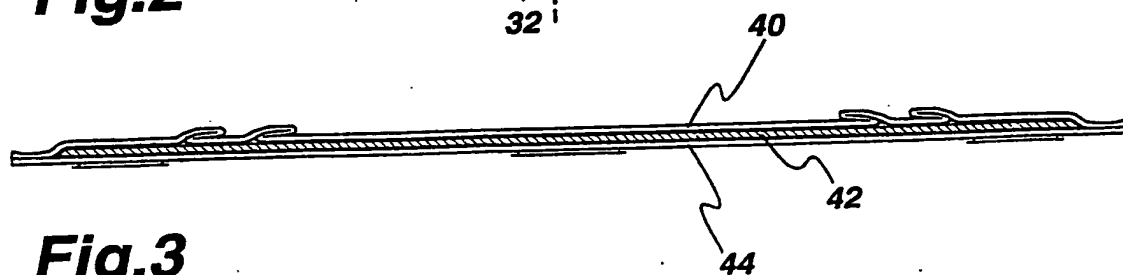
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**Fig. 1**



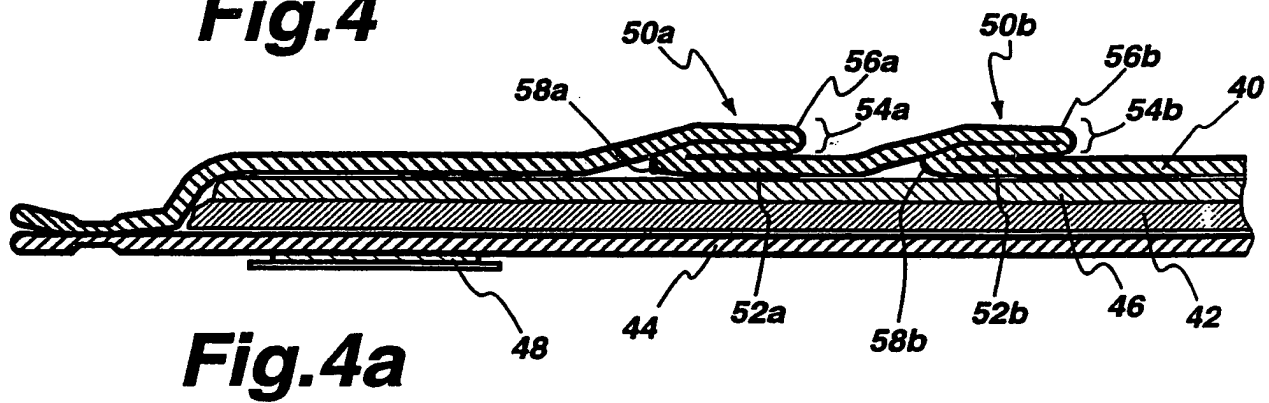
**Fig. 2**



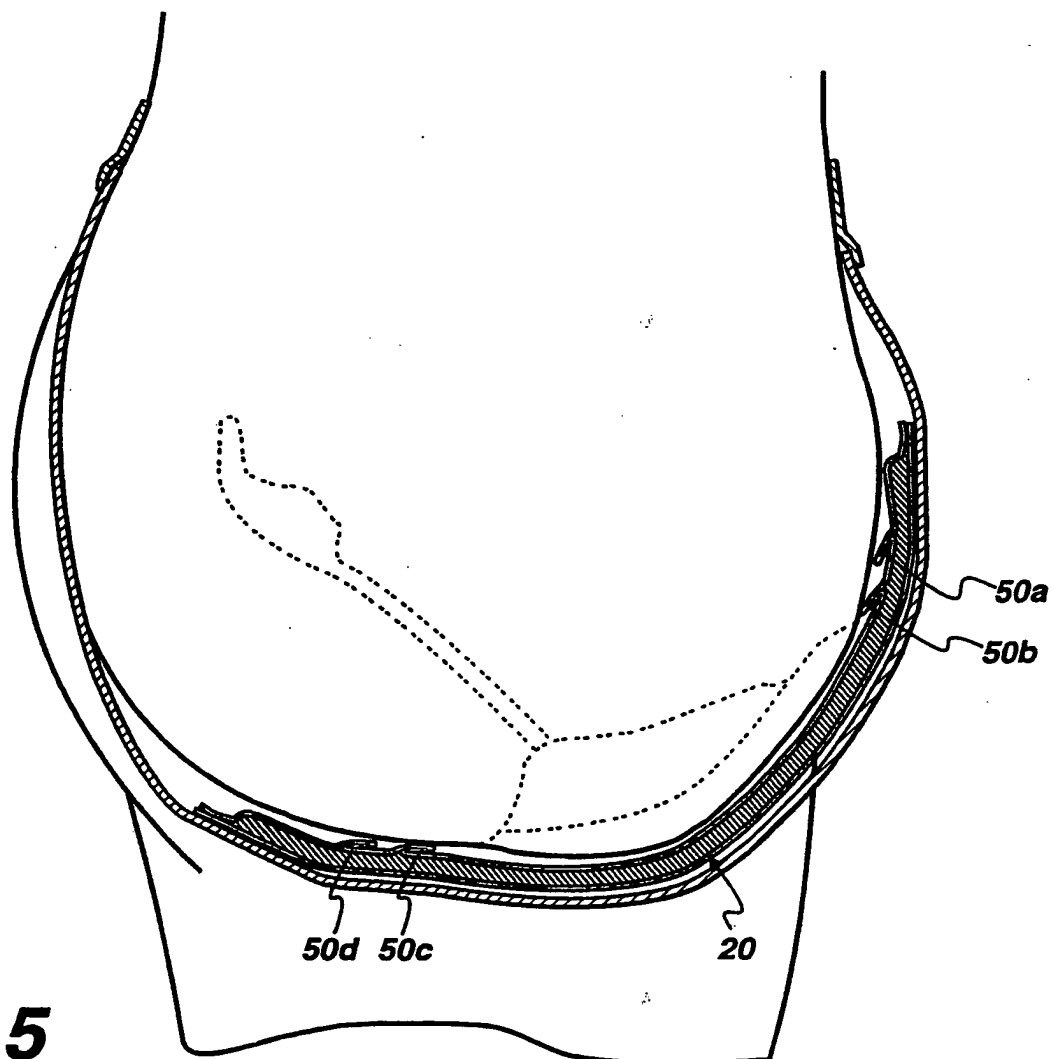
**Fig. 3**



**Fig.4**

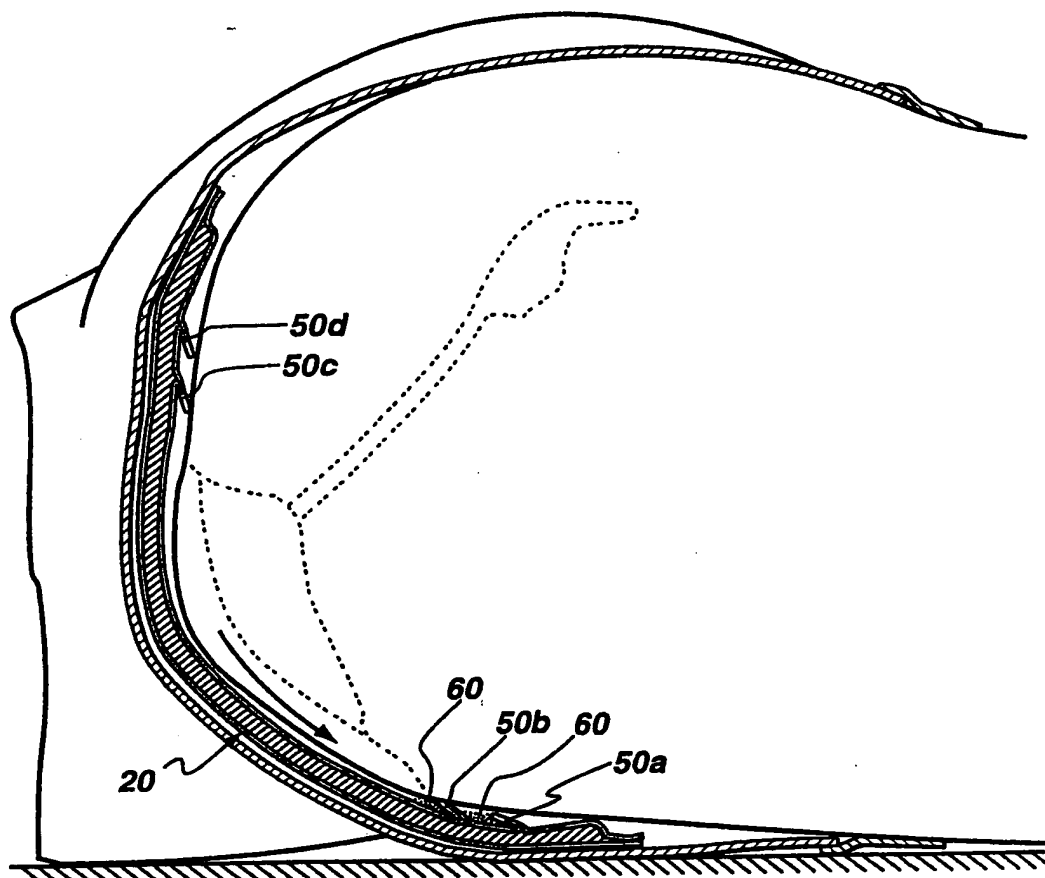


**Fig.4a**

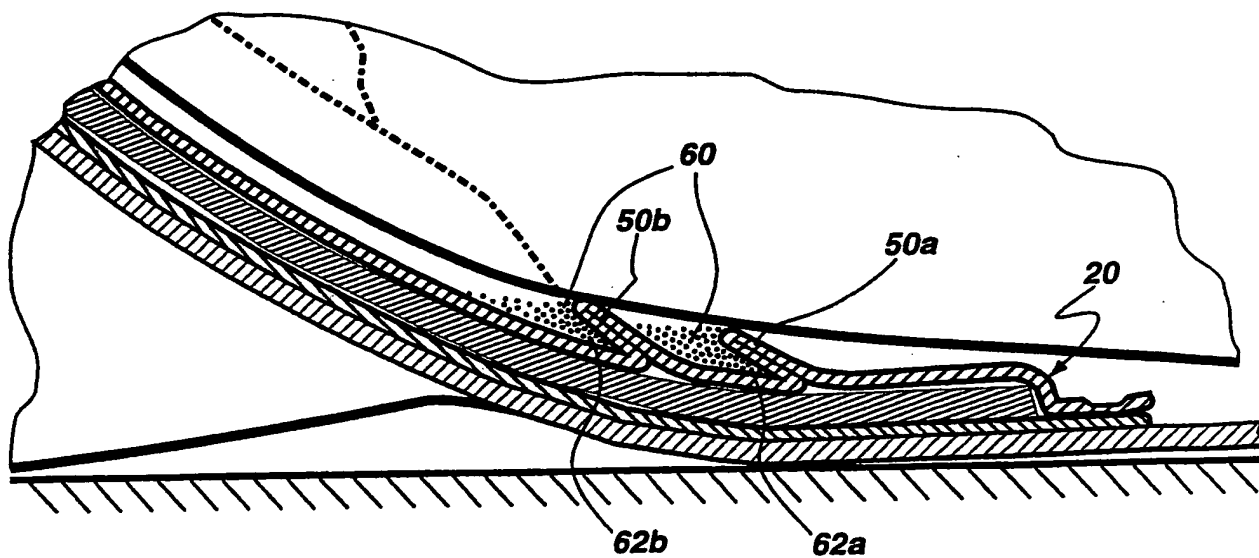


**Fig.5**

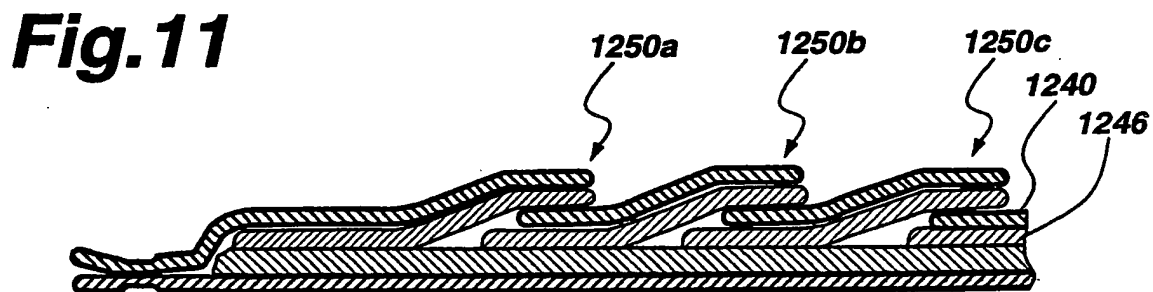
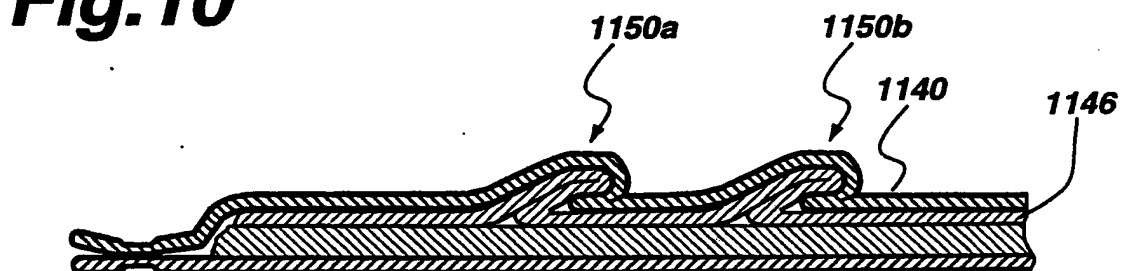
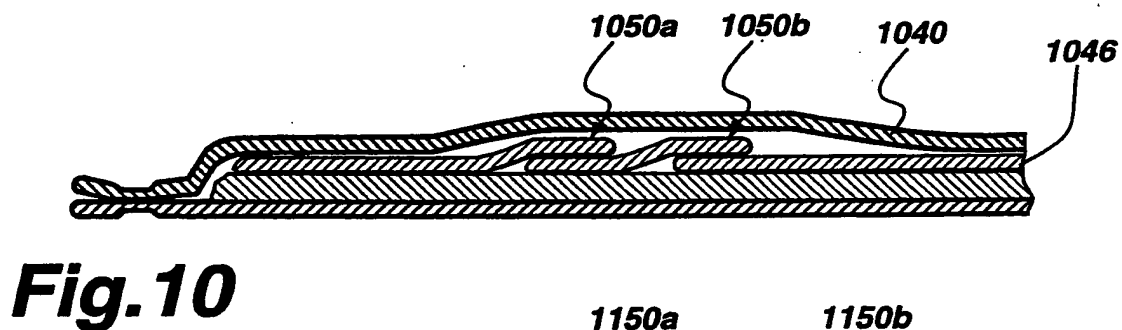
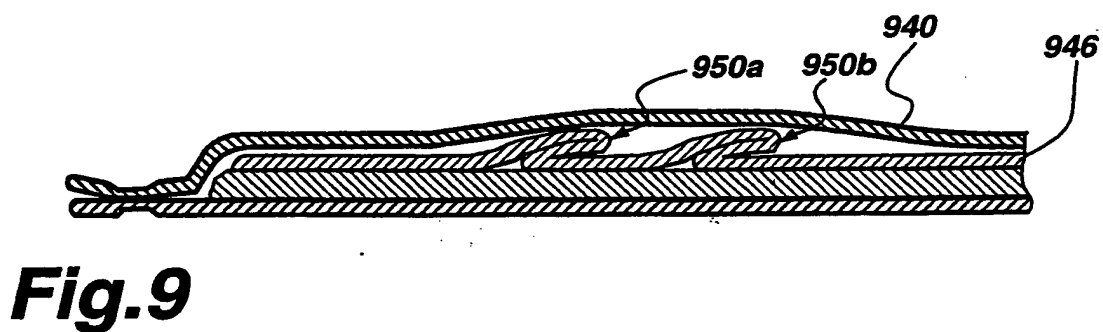
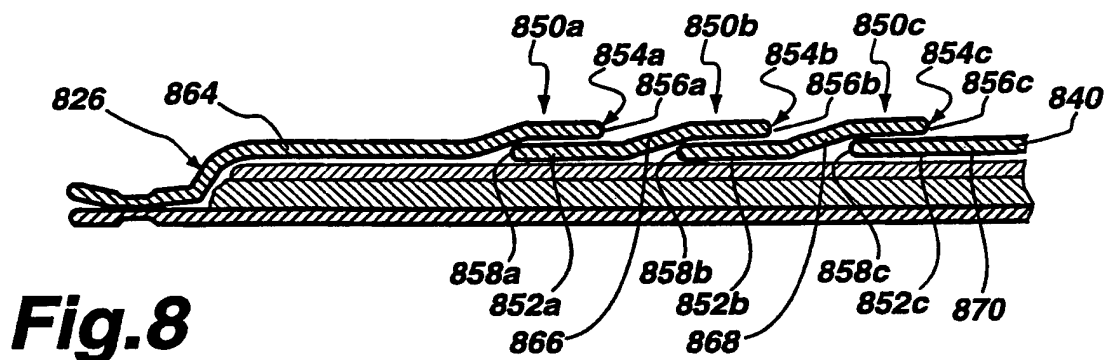
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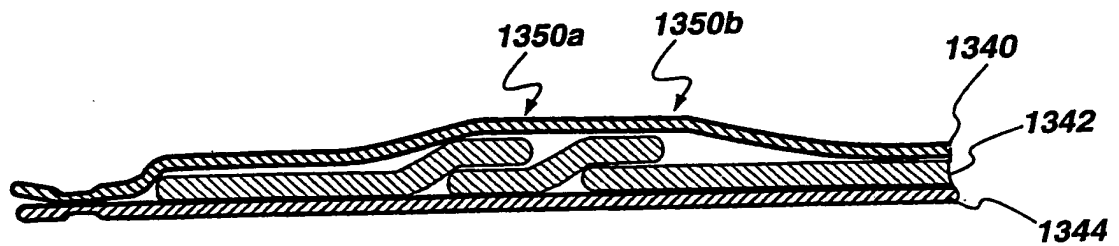
**Fig.6**



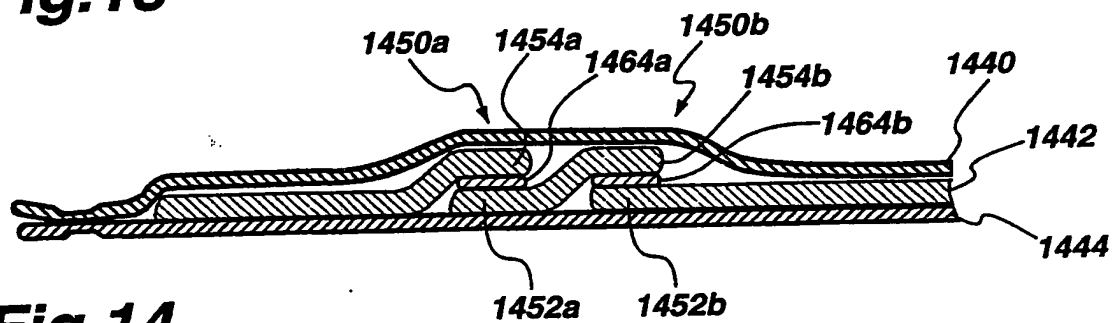
**Fig.7**



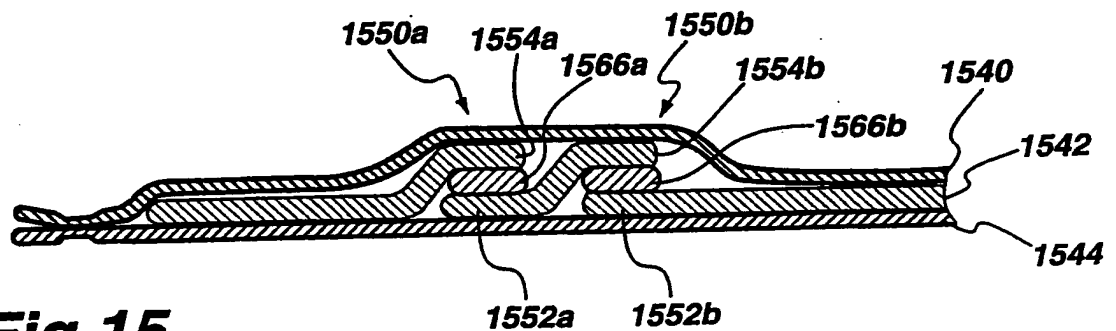
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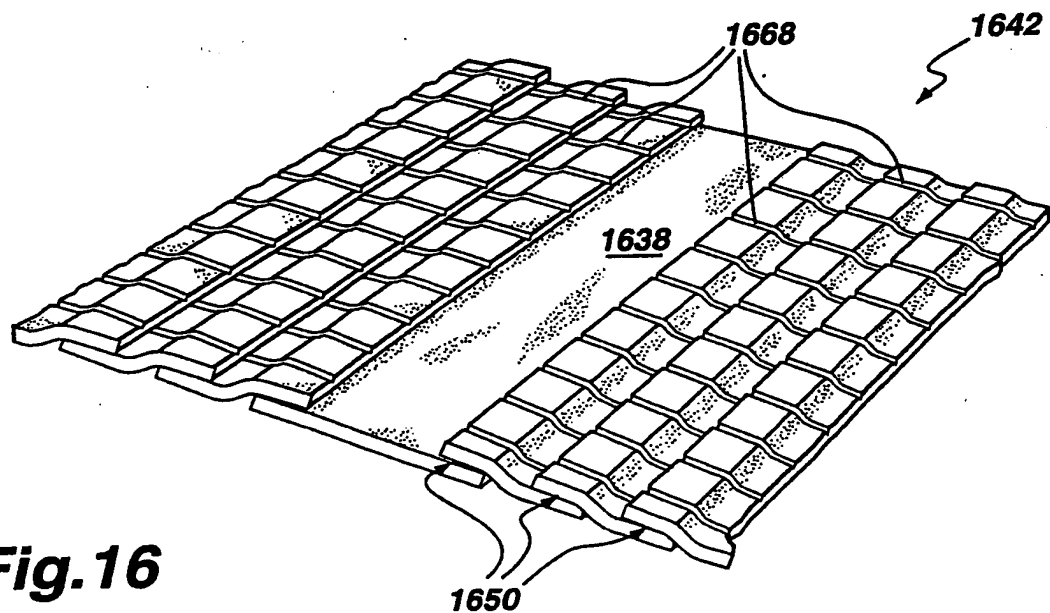
**Fig.13**



**Fig.14**



**Fig.15**



**Fig.16**

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 99/00139

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 14429 A (MOELNLYCKE AB) 3 September 1992  see page 4, line 16 - page 6, line 3; figures 1-3	1-4, 6-10, 12-15, 24, 25
X	DE 195 34 826 A (LUDEWIGT CHRISTOPH) 27 March 1997  see the whole document	1-4, 6-10, 12-15, 24, 25
A	GB 2 291 354 A (MOELNLYCKE AB) 24 January 1996  see claims; figures	1-4, 6-10, 12-15, 24, 25

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search

10 June 1999

Date of mailing of the international search report

17/06/1999

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 99/00139

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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